

Office Action Summary

Application No.

09/977,207

Applicant(s)

MIURA ET AL.

Examiner

Trung Dang

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 6/10/03.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 15-27 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 18-27 is/are allowed.
- 6) ☒ Claim(s) 15-17 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☒ Certified copies of the priority documents have been received in Application No. 08/610,488.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

DETAILED ACTION

1. The obviousness-type double patenting rejection of claims 15-17 is withdrawn in light of the Terminal Disclaimer filed 12-10-02. However, the rejection of claims 15-17 over prior art of record is maintained and repeated herein.

2. ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 15-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kunikiyo (U.S.Pat. No. 5,668,403) in view of Chiu et al. (U.S. Pat. No. 5,470,783), all of record.

Kunikiyo teaches a process for producing a semiconductor device comprises the steps of: forming an element isolation oxide film 7 on a silicon substrate by thermal oxidation using a patterned nitride film 3 as a mask; removing the nitride mask 3, and thereafter carrying out a heat-treatment at a temperature of 950 °C or more in a nitrogen atmosphere to relax stress in the isolation oxide film; and forming a gate oxide film, a source and a drain, electrode and wiring, and an insulating film so as to form a transistor. See Embodiment 1 and Fig. 7.

Kunikiyo differs from the claims in not disclosing that the thermal oxidation is carried out at the temperature of 850 °C in an atmosphere of a gaseous of hydrogen and oxygen or in an atmosphere of H_2O . However, Chiu teaches a field oxide is grown in a conventional wet oxidation environment of $H_2O + O_2$ or $H_2 + O_2$ at a nominal temperature of about 800 °C to about 1000 °C (col. 6, lines 6-9). It would have been obvious to one having ordinary skill in the art at the time the invention was made to carry out the thermal oxidation of Kunikiyo under the condition taught by Chiu because such thermal process for forming the field oxide is conventional in the art, and the application of a known process to make the same would have been within the level of an artisan, absent a showing of unexpected results from applicants.

3. Applicant's arguments filed 12-10-2002 have been fully considered but they are not persuasive.

With respect to the rejection of claims 15-17 under 35 U.S.C § 103(a) over Kunikiyo in view of Chiu et al., applicants in page 6 of the Remarks argue that Kunikiyo disclosed that after forming a LOCOS oxide film, the nitride film 3 and the underlying oxide film 2 around the LOCOS are removed to expose the substrate 1, followed by a heat treatment in nitrogen

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atmosphere. Kunikiyo does not disclose that a high temperature heat treatment is conducted while the substrate around the element isolation region is covered with an oxide film as in the present invention.

The Examiner respectfully disagrees with applicants' arguments for the following reasons:

Applicants stated that the present invention performs the high temperature heat treatment while the substrate around the element isolation region is covered in an oxide film, yet claims 15-17 contain no limitation which indicates such oxide film (commonly referred in the LOCOS art as a pad oxide) has been formed on the surface of the substrate so that when the nitride mask is removed after formation of the element isolation oxide (LOCOS oxide), the pad oxide is exposed and around the LOCOS oxide. Note that the limitation "the oxide film" recited at line 4 of claim 15 refers to the "element-separating oxide film" (i.e. the element isolation or LOCOS oxide) recited at line 2, not the oxide film that applicants stated in the argument. Moreover, the limitation "removal of an oxidation preventing film" (i.e. the nitride mask) does not necessarily mean an underlying oxide film will be exposed because the claim does not has a step of forming the underlying oxide film.

With respect to Chiu, applicants argue that Chiu shows growing a field oxide, and does not teach nor suggest a subsequent heat treatment in an inert atmosphere to relax stress. However, in the rejection, the Examiner relied on Chiu's reference for the teaching the thermal oxidation for forming the element-separating oxide (field oxide) is known in the art to be carried out in an atmosphere of $H_2O + O_2$ or $H_2 + O_2$. The heat treatment in an inert atmosphere to relax stress is taught by Kunikiyo, not Chiu.

4. The following is an examiner's statement of reasons for allowance:

Claims 18-27 are allowable over prior art of record because none of prior art teaches or suggests the claimed feature of performing the heat treatment at a temperature of 800 °C or higher in an inert atmosphere, wherein a thermal oxide film has been formed on the substrate prior to the aforementioned heat-treatment step.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue

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fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Trung Dang whose telephone number is 703-308-2548. The examiner can normally be reached on weekdays from 9:00AM to 5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri, can be reached on (703) 306-2794. The fax phone number for the organization where this application or proceeding is assigned is 703-746-4080.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

Trung Dang
Primary Examiner

A handwritten signature in cursive script, appearing to read 'Trung Dang', is written below the printed name and title.